

High Performance ADC for Reconfigurable/Reprogrammable Communication Systems, Phase I

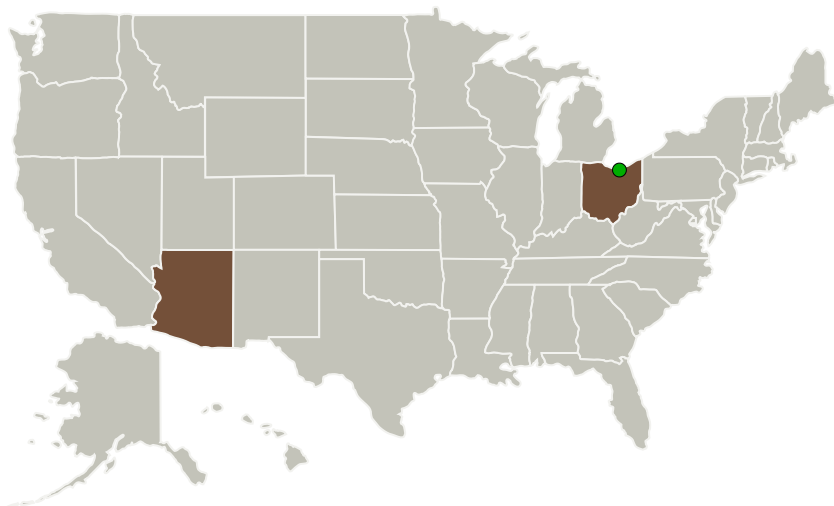
Completed Technology Project (2012 - 2012)



Project Introduction

Ridgetop Group will develop a 3X improvement in sampling resolution over current state-of-the-art analog-to-digital converter (ADC) technology to support reconfigurable/reprogrammable communication systems. The significance of this innovation lies in the time-interleaved pipeline ADC, based on the most advanced silicon-germanium (SiGe) BiCMOS technology available, with over 2 bits higher effective number of bits (ENOB = 11.0 bits) than the best commercially available radiation-tolerant 2 GS/s ADCs (ENOB = 8.9 bits). In addition, the ADC consumes 65% less power than commercial ADCs, conserving valuable spacecraft power. For maximum flexibility and minimal power consumption, the ADC provides two configurable pipeline channels and four programmable operation modes. The ADC will also provide 3 GHz input analog bandwidth for direct sampling of RF signals in the S-band. The ADC will tolerate 5 Mrads of total ionizing dose (TID) radiation due to the inherent radiation tolerance of the SiGe heterojunction bipolar transistors (HBT), 130 nm thin-oxide CMOS transistors, and standard radiation-hardening-by-design (RHBD) techniques. The ADC will be also sufficiently hardened against single-event effects (SEE). Ridgetop will fabricate and test the ADC in the IBM 130 nm BiCMOS SiGe process in Phase 2 of this SBIR program.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Ridgetop Group, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Tucson, Arizona
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

Arizona	Ohio
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Project Transitions

**February 2012:** Project Start**August 2012:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138206>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Ridgetop Group, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

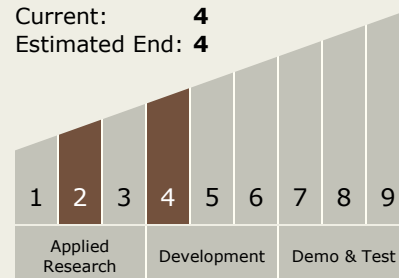
Esko O Mikkola

Technology Maturity (TRL)

Start: 2

Current: 4

Estimated End: 4



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Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.2 Radio Frequency
 - └ TX05.2.1 Spectrum-Efficiency

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System